8. Your fate may be in your own hands—wash your hands before eating.

9. Don't let the waste products of digestion accumulate—drink a glass or two of water on getting up.

10 Don't use a napkin, towel, spoon, fork, glass or cup which has been used by another person and not washed.

11. Avoid tight clothes, tight shoes, tight gloves—seek to make nature your ally not your prisoner.

12. When the air is pure breathe all of it you can—breathe deeply.

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THE FREAS SYSTEM

Professor Thomas B. Freas, of the department of chemistry of Columbia University, has devised a scheme for the handling of apparatus and supplies that is not only novel and capable of indefinite expansion and adaptability to any chemical laboratory, but takes out of the hands of the instructional staff all handling of students' apparatus and chemicals.

The object of the Freas system is fourfold. First, to save the student's time by giving him all the chemicals and apparatus he needs at his bench, second, to insure pure and clean chemicals, third, to save of chemicals by giving the student just the amount needed, and doing away with the wasteful and sloppy side shelf reagents bottle, and fourth, to relieve the instructor of those details, and thus to enable him to devote his entire time to teaching and research.

Professor Freas has been too busy to publish an account of his scheme, and his extreme modesty prevents him undertaking the task, had he the time. As an interested outsider who has watched very closely how it works, at Columbia, I am perhaps better qualified than even he to speak of what seems to me the best scheme in America to handle this difficult problem. This scheme has been in operation in all divisions of chemistry at Columbia for the past seven years, and has given an ever increasing satisfaction to all concerned.

Many instructors spend most of their time handling supplies, although they are hired to teach, but they are not allowed to do so by the short-sighted and expensive policy of many institutions, which compel them to do work which a moderately paid employee could do just as well. One full professor of industrial chemistry of my acquaintance spends a greater part of his time supplying his students with chemicals, when an organized system could do it immensely better, leaving him free to devote his time to instruction.

In a modern chemical laboratory, and especially so in a large one, the problems are so numerous and so complex, that modern business methods require a sharp line to be drawn between the pedagogic and administrative affairs from those of up-keep maintenance, purchase, and handling of supplies. This eventually demands that the head of the department divest himself of all duties pertaining to the physical side of the laboratory, and turn that work over to the carefully selected and specially trained curator of supplies. If the administrative head has chosen wisely, he is not only relieved of an enormous burden, thus freeing himself for the instructional side of his profession, but the laboratory students and instructional staff gain by having this work done by an expert.

The success of the Freas system depends upon having some one man in the department, who is interested, selected to be the curator of supplies. He must have recognition, both in rank and salary, to attract a man of character, ability and training in laboratory needs. His time should be free for general guidance of others, by having several competent assistants, one in the office, one to handle chemicals and superintend the bottling, and one to handle all apparatus. In a small chemical department some of these divisions could be combined. The man or preferably a woman, in charge of the office, attends to all student accounts, keeps the books, takes dictation, and if the work is excessive has enough help to properly handle the work. The salary is about $75 to $100 a month, with two weeks' vacation, and one week sick leave during the year. This

applies to all the assistants in the stock system.

The man who handles the chemicals must have a steady working force, determined by the demands of the department. He is held responsible for the care and storage of all chemicals, and must notify the office of any needs. His main duty is, however, the bottling of liquid and solid reagents for student kits in ample time to have them ready at the beginning of each term. In a chemical department of 700 students this is an enormous task, when one course may require 140 different bottles per man. But with a good man in charge of several boys, and in rush times, extra student help, those chemicals can be put up, gathered together, in sets, and got ready for the student rush on the first day of the term. The man in charge need not receive over from $90 to $125 per month, and the boys over $10 a week. Student help may be used at an hourly remuneration, differing with the locality and the school.

The cost of this entire work is very small, when compared with the expense when this same work is done in the old way by a $3,000 a year man. The apparatus can be well handled by any capable woman with one or more assistants.

On checking out day the instructor assigns a student to a laboratory bench. The students take that slip to the office to see that all fees have been paid, and deposit for excess chemicals and breakage have been made. At the supply window he now receives and signs for his entire kit of chemicals and apparatus for one term. That material he arranges in his desk according to a plan which is given him. He locks his desk with his own padlock, which he can get from the stock-room if he wishes to do so, for a small sum. He now has his own chemicals and apparatus in his own individual locker, protected by his own padlock, to which he only has the key. The student is now solely responsible for breakage and loss, and his excess chemicals and breakage deposit protects the department against loss either from accident or by the student leaving the institution. Should he need extra chemicals or supplies, he can easily obtain these at the supply window by signing for the same. At Columbia the student receives as free allowance, the average chemicals needed for his particular course, and pays for excess chemicals, as being a loss due to his carelessness.

Many benefits arise from this arrangement, viz., individual responsibility for care of apparatus and chemicals; a much reduced consumption of chemicals, because the amount given is just sufficient for the experiment, plus a slight margin for unavoidable waste; all unnecessary movement is eliminated, as the student seldom has to leave his own bench, providing the laboratory is modern, and has at the benches individual student hoods; a doubling of the assigned amount of laboratory work, in the same time, due to a reduction of lost motion, and moving about the room, as exists under the old fashioned side reagent scheme, and finally, a relieving of the instructor of every duty, but that of teaching, which is probably the most important of all. A set of weights and a rough hand balance as a part of the kit avoids having common weights and balances, and the necessary walking and waiting one's turn to weigh under the old plan. The laboratory has no common property of any kind where theft, contamination, or injury is possible. The only exception is in the balance room, where two or more men are assigned to a quantitative balance, which is locked, and only assigned men have keys. Here responsibility can easily be fixed among a very few students.

Such a plan can only be possible when the curator of supplies has the sympathetic cooperation and support of the administrative head of the department. Many well meaning administrators of the old school pay little attention to the application of modern business methods to running a laboratory. Efficiency and expert ideas, when applied to that job are frowned on. It is the author's opinion that these men can not be regarded as progressive administrators, and it is his conviction that the department will go on in the same old way as back numbers, till some one

wakes up, or those who obstruct progress retire. There is no question, but that the chemical department which undertakes to run its laboratory on a strict business basis, will not only give their students more and better service for the same money, but will turn out better trained men than the laboratory with less up-to-date methods.

The College of the City of New York has partly adopted the Freas System, with such satisfactory results that we have almost doubled the amount of laboratory work given to the students per afternoon. The author feels that we should go the whole way and reap the full reward in more efficient work on the part of student and instructor. Starting is the big thing, but when once started, the plan will grow by its own intrinsic merits.

For a number of years past, the summer session of Columbia University has offered a course in laboratory organization and management, where the ideas I have here discussed have been carefully criticized by the students taking the course, mostly men and women of experience along the same line in other institutions.

Further details of this scheme will appear from time to time.

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ORGANIZATION MEETING OF THE AMERICAN SECTION OF THE PROPOSED INTERNATIONAL ASTRONOMICAL UNION

At the organizing meeting of the International Research Council held in Paris in November, 1918, it was decided to establish an International Astronomical Union, to continue and extend the work formerly conducted by such international astronomical organizations as the committee of the Carte du Ciel, the International Union for Cooperation in Solar Research, and similar bodies less formally constituted which dealt with various questions relating to astronomy and its applications. The International Research Council adopted a resolution requesting the National Academy of Sciences, or the corresponding organization in each of the countries represented, to take the initiative in organizing the section to represent that country in the International Astronomical Union. The tentative plan of organization of the American Section of the Astronomical Union, as approved by the president of the National Academy of Sciences, involved the representation of the various interests concerned as given below.

Upon the call of Dr. George E. Hale, acting for the National Academy of Sciences, the organization meeting for the American Section of the proposed Astronomical Union was held in the office of the National Research Council, Washington, D. C., March 8, 1919. The delegates who had been appointed by the presidents of the respective societies, or by the government, were as follows:

National Academy of Sciences—5.

H. D. Curtis acting for W. W. Campbell, G. E. Hale, A. A. Michelson, F. R. Moulton, Frank Schlesinger.

American Astronomical Society—10.

C. G. Abbot, S. I. Bailey, E. W. Brown, E. B. Frost, A. O. Leuschner, S. A. Mitchell, W. J. Humphreys, H. N. Russell, Joel Stebbins (absent, J. F. Hayford).

American Mathematical Society—3.

Frank Morley (two others to be appointed).

American Physical Society—3.

Henry Crew (absent, J. S. Ames, Theodore Lyman).

U. S. Naval Observatory—1.

J. A. Hoogewerff, accompanied by W. S. Eichelberger, Asaph Hall, F. B. Littell.

U. S. Coast Survey—1.

William Bowie.

The meeting organized by appointing Mr. Hale as chairman and Mr. Stebbins secretary. There followed a general discussion of the present international situation of science, and it was agreed that the union should take the place of previous international bodies in astronomy.

It was voted that the organization of the section should be considered temporary until